

**REMARKS**

Claims 6-9 and 11-18 are canceled without prejudice. Claims 52-63 are added. Claims 1-5, 10, 19-63 remain in the application for consideration. In view of the following remarks, Applicant respectfully requests reconsideration and withdrawal of the rejections.

**Objection To Color Drawings**

The Office has objected to the color drawings which have been filed in the present application. The Office notes that the drawings are acceptable for examination purposes, but that a petition filed under 37 CFR 1.84(a)(2) or (b)(1) will be needed if the drawings are to be used as formal drawings. Applicant intends to submit formal drawings when the application is allowed.

**Allowed and Allowable Subject Matter**

Claims 29-45 are indicated by the Office as allowed. Applicant thanks the Office for the indication of allowable subject matter.

Additionally, claims 6-9 and 11-18 are objected to as being dependent from a rejected base claim, but are otherwise allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. These claims have been canceled without prejudice and have been rewritten in independent form as new claims 52-63. Specifically, claim 52 corresponds to claim 6 and includes the limitations from claims 5 and 1. Claim 53 corresponds to claim 7 and depends from claim 52. Claim 54 corresponds to claim 8 and includes the limitations from claims 5 and 1. Claim 55 corresponds to claim 9 and depends from claim 55. Claim 56 corresponds to claim 11 and includes the

1 limitations from claims 10 and 1. Claim 57 corresponds to claim 12 and includes  
2 the limitations from claim 1. Claims 58, 59 and 60 correspond to claims 13, 14,  
3 and 15 respectively, and depend from claim 57. Claim 61 corresponds to claim 16  
4 and includes the limitations from claim 1. Claims 62 and 63 correspond to claims  
5 17 and 18 respectively, and depend from claim 61.

6 As these claims constitute re-written versions of the previously-objected to  
7 claims, these claims should be summarily allowed.

8                   §102 and 103 Rejections

9                   Claims 19-28 stand rejected under 35 U.S.C. §102(e) over U.S. Patent No.  
10 6,163,322 to LaChapelle.

11                  Claims 1-5 stand rejected under 35 U.S.C. §103(a) over LaChapelle in view  
12 of U.S. Patent No. 6,351,269 to Georgiev.

13                  Claim 10 stands rejected under 35 U.S.C. §103(a) over LaChapelle in view  
14 of Georgiev and a document to Parke entitled *Computer Facial Animation*.

15                  Claims 46-51 stand rejected under 35 U.S.C. §103(a) over Parke in view of  
16 Georgiev.

17                  Before undertaking a discussion of the substance of the Office's rejections,  
18 the following discussion of LaChapelle is provided in an attempt to help the Office  
19 appreciate various distinctions between the claimed embodiments that are rejected  
20 over LaChapelle and LaChapelle itself.

22                   The LaChapelle Reference

23                  LaChapelle discloses an animation system that is used in a facial animation  
24 system allowing a user to generate a facial animation sequence. LaChapelle's  
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1 process can be divided into five distinct stages namely actor motion; computation  
2 of displacement parameters; computation of weights; generation of animation  
3 model and display. As LaChapelle instructs, at each time frame  $t$ , a synthetic  
4 posture or expression of a face is constructed by obtaining a linear combination of  
5 data elements representative of basic facial expressions located in a database.

6 Exploring how this is done in more detail, LaChapelle instructs that the  
7 database is composed of basic expressions and comprises a so-called neutral  
8 expression  $E_0$  and a set of  $n$  basic expressions. The  $n$  basic expressions are based  
9 on this neutral expression  $E_0$ . An example of a particular database of expressions  
10 appears in LaChapelle's Fig. 2. Notice the neutral expression  $E_0$  appears in the  
11 upper left corner of the illustrated expressions.

12 Next, as instructed in column 9, lines 43-50, a registration stage occurs in  
13 which markers located on a live performer's face are mapped onto points on the  
14 neutral facial expression  $E_0$  of the model in the synthetic coordinate space.  
15 LaChapelle refers to this projection as a "mapping template". As LaChapelle  
16 notes, this scaled projection forms the link between the synthetic character and the  
17 performer and allows transferring proper marker displacements to the system.

18 In a typical interaction, as instructed in LaChapelle, sets of markers on the  
19 performer's face are used to track the movements of the face of the performer.  
20 These markers are located at strategic positions to capture the global movements  
21 of the face. During the recording sequence, the performance actor moves his face  
22 in a desired fashion in order to supply motion information to the animation system.  
23 The specific motion is left to the discretion of the performance actor. At each  
24 frame, the movements of the physical markers are collected. By analyzing the  
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1 position of the markers from one frame to another, the marker displacement can be  
2 obtained.

3 As instructed in column 10, lines 26-40, an animated sequence can be  
4 obtained by constructing one facial expression for each time frame and  
5 interpolating the result for the time between frames. That is, the animation  
6 apparatus creates the desired expression  $E_f$  corresponding to the motion of the  
7 markers by using the set of n basic facial expressions and the neutral expression  $E_0$   
8 stored in the database of basic facial expressions. The data collected are  
9 displacement data indicative of a desired shift of position of the synthetic face  
10 through different expressions. Each frame of the displacement data forms the  
11 source data necessary to build the synthetic face corresponding to the facial  
12 expression characterized by the source data.

13 Following the motion of the actor, the displacement of the physical markers  
14 is mapped onto a displacement in the synthetic coordinate space. This is done by  
15 computing a displacement vector [e] from a reference. LaChapelle instructs that  
16 the neutral expression  $E_0$  is used as the reference. The mapping template referred  
17 to above is used to translate the physical displacement of the markers into  
18 displacements in the synthetic coordinate space.

19 Next, as instructed in column 10, lines 66+, to generate the animation  
20 sequence, a number of weights are calculated and are assigned to each basic  
21 expression in the database to create the facial expression  $E_f$ .

22 The complete expression  $E_f$  is then constructed by computing the linear  
23 combination of the expressions in the database using the weights obtained.  
24 Finally, the synthetic model with the generated expression  $E_f$  can be generated and  
25 displayed to yield an animated sequence.

1  
2 **The Claims**

3 **Claim 1 recites a facial expression transformation method comprising:**

- 4
- 5     • defining a code book containing data defining a first set of facial  
6         expressions of a first person;  
7     • providing data defining a second set of facial expressions, the second  
8         set of facial expressions providing a training set of expressions of a  
9         second person who is different from the first person;  
10    • deriving a transformation function from the training set of  
   expressions and corresponding expressions from the first set of  
   expressions; and  
11    • applying the transformation function to the first set of expressions to  
   provide a synthetic set of expressions.

12              In making out the rejection of this claim, the Office argues that LaChapelle  
13 discloses the recited act of "defining" at column 4, lines 29-46, the recited act of  
14 "providing" at column 8, lines 22-25, and the recited act of "deriving" at column  
15 9, lines 43-51. The Office then admits that LaChapelle does not disclose the  
16 recited act of "applying", but cites to Georgiev, column 4, lines 47-61 in support  
17 thereof. The Office then argues that it would be obvious to combine the cited  
18 material in LaChapelle with the material cited in Georgiev to render the claimed  
19 subject matter obvious. As motivation for making this combination, the Office  
20 states that it would "provide flexibility in modifying images."

21              Applicant respectfully disagrees with the Office and submits that the Office  
22 has not established a *prima facie* case of obviousness for a number of different  
23 reasons. First and foremost, the stated motivation for making this combination  
24 (and the other combinations in the present Office Action) is not stated with  
25 specificity and particularity, as it must be. *See, e.g., In Re Kotzab*, 217 F.3d 1365,

1 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("*particular findings* must be made  
2 as to the reason the skilled artisan, with no knowledge of the claimed invention,  
3 would have selected these components for combination in the manner claimed").

4 Assuming, for argument's sake alone, that LaChapelle and Georgiev  
5 disclose the features that the Office argues it does (which, as will be noted below,  
6 they do not), stating, as the Office does, that the combination would be obvious  
7 insofar as providing "flexibility in modifying images" is simply so broad and  
8 sweeping so as to cover any purported modification of LaChapelle. Accordingly,  
9 Applicant respectfully submits that the Office's stated motivation for combining  
10 these references is lacking in the kind of particular findings that it must have in  
11 order to make out a case of *prima facie* obviousness.

12 Notwithstanding the fact that the Office has failed to make out a *prima*  
13 *facie* case of obviousness, the Office's interpretation and application of the  
14 LaChapelle is misplaced and does not, as the Office contends it does, disclose the  
15 features that it is argued to disclose.

16 Preliminarily, however, it is unclear to Applicant what features in  
17 LaChapelle the Office assigns to Applicant's claim elements. This is because of a  
18 perceived ambiguity in the sections of the LaChapelle that the Office cites as  
19 disclosing the particular acts described above. There do appear to be two different  
20 interpretations that one might make:

- 21  
22 (1) The Office considers LaChapelle's performer as the  
recited first person and the animated expressions as the  
recited second person; or  
23 (2) The Office considers LaChapelle's animated expressions  
as the recited first person and the performer as the second  
24 person.  
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3 As a simple exercise in applying LaChapelle to claim 1, each of the  
4 individual interpretations above is applied to claim 1, by simply substituting  
5 LaChapelle's features for the recited claim features. Consider first interpretation  
6 (1) (i.e. LaChapelle's performer = the first person, and LaChapelle's animated  
7 figure = the second person):

8  
9 A facial expression transformation method comprising:  
10 defining a code book containing data defining a first set of facial  
expressions of a [performer with markers on their face];  
11 providing data defining a second set of facial expressions, the second  
set of facial expressions providing a training set of expressions of a  
[animated figure] who is different from the [performer with markers on  
their face];  
12 deriving a transformation function from the training set of  
expressions [of the animated figure] and corresponding expressions from  
the first set of expressions [of the performer with markers on their face];  
and  
15 applying the transformation function to the first set of expressions  
[of the performer with markers on their face] to provide a synthetic set  
16 of expressions.

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18 This interpretation does not seem to make any sense for a number of  
19 different reasons. First, an interpretation of LaChapelle which finds its animated  
20 figure providing a "training set of expressions" is logically inconsistent with  
21 LaChapelle. If anything, any training is conducted using the performer with  
22 markers on their face. See, e.g. column 9, lines 43-51 (i.e. defining the mapping  
23 template). Additionally, LaChapelle applies its transformation function to its  
24 animated figure, not the performer with markers on their face. So, with this  
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1 particular interpretation, LaChapelle clearly does not disclose the subject matter of  
2 this claim.

3 Now consider interpretation (2) (i.e. LaChapelle's performer = the second  
4 person, and LaChapelle's animated figure = the first person):

5 A facial expression transformation method comprising:  
6 defining a code book containing data defining a first set of facial  
7 expressions of a [animated figure];

8 providing data defining a second set of facial expressions, the second  
9 set of facial expressions providing a training set of expressions of a  
[performer with markers on their face] who is different from the  
[animated figure];

10 deriving a transformation function from the training set of  
expressions [of the performer with markers on their face] and  
corresponding expressions from the first set of expressions [of the  
animated figure]; and

11 applying the transformation function to the first set of expressions  
[animated figure] to provide a synthetic set of expressions.

12  
13  
14 Using this interpretation, it is apparent that LaChapelle does not disclose  
15 the features that the Office argues it does. First, LaChapelle does not disclose or  
16 suggest the act of "providing data defining a second set of facial expressions, *the*  
17 *second set of facial expressions providing a training set of expressions* of a second  
18 person who is different from the first person". That is, to the extent that  
19 LaChapelle discloses any training, it does so using only a single expression of the  
20 performer and not a *set of expressions*. For example, as noted in column 9, lines  
21 43-51, registration mapping takes place using only the performer's face in a single  
22 position—its so-called natural position. Thus, it cannot be said that LaChapelle  
23 derives any transformation function from a *training set of expressions* and  
24  
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1 corresponding *expressions* from a first set of expressions. Accordingly, for at least  
2 this reason, the Office's interpretation of LaChapelle is misplaced.

3 This being the case, LaChapelle cannot disclose or suggest the recited act of  
4 "applying", which the Office admits. The Office then relies on Georgiev and  
5 argues that it discloses applying a transformation function to a first set of  
6 expressions to provide a synthetic set of expressions, and cites to column 4, lines  
7 47-61 for support. Applicant disagrees with the Office's application of this  
8 reference, particularly when viewed in light of LaChapelle.

9 Specifically, LaChapelle teaches that a desired expression is obtained by  
10 constructing a linear combination of the basic facial expressions in its database  
11 that best follows the displacements of the physical markers on a performer's face.  
12 Georgiev simply discloses, in the cited passage, transporting a facial expression of  
13 one person to another person using a so-called change vector. Specifically, as  
14 shown in Fig. 6, a change vector 301 is found that describes the change between a  
15 neutral face 300 and a smiling face 302 of the same person. This change vector  
16 301 is then applied to a new face 304 to provide a smiling new face 306.

17 Applicant notes that this change vector (apparently considered by the  
18 Office as equivalent to the recited "transformation function") does not appear to be  
19 derived at all from a *training set* of expressions, as contemplated in the present  
20 claim. Rather, this change vector simply describes the change from a neutral face  
21 to a smiling face. As noted, the claim element that first introduces the  
22 transformation function recites "deriving a *transformation function* from the  
23 training set of expressions and *corresponding expressions* from the first set of  
24 expression." Georgiev does not appear to disclose or in any way suggest a  
25 method in which its change vector is derived from a training set of expressions and

1       corresponding expressions from a first set of expressions. This being the case,  
2       Georgiev cannot possibly disclose or suggest applying any such transformation  
3       function to a first set of expressions to provide a synthetic set of expressions.

4       This claim recites a transformation function that is derived in a specifically  
5       recited way. The Office is not free to ignore these specific recitations. Further, as  
6       noted above, neither LaChapelle nor Georgiev disclose or in any way suggest  
7       derivation of a *transformation function* as that term is understood in the context of  
8       the present claim and described in the specification. Accordingly, for at least this  
9       reason, this claim is allowable.

10      **Claims 2-5 and 10** depend from claim 1 and are allowable as depending  
11     from an allowable base claim. These claims are also allowable for their own  
12     recited features which, in combination with those recited in claim 1, are neither  
13     disclosed nor suggested in the references of record, either singly or in combination  
14     with one another. Given the allowability of claim 1, the rejection of claim 10 over  
15     the combination that includes Parke is not seen to add anything of significance.

16      **Claim 19** recites one or more computer-readable media having computer-  
17     readable instructions thereon which, when executed by a computer, cause the  
18     computer to:

- 19
- 20           • operate on a training set of expressions from one person and  
21           corresponding expressions from a code book of another person to  
22           compute a linear transformation function from the training set and  
23           their corresponding expressions; and
  - 24           • apply the transformation function to a plurality of expressions from  
25           the code book to provide a synthetic set of expressions.

1        In making out the rejection of this claim, the Office argues that LaChapelle  
2 discloses operating on a training set of expressions from one person and  
3 corresponding expressions from a code book of another person and cites to column  
4 8, lines 22-25 and column 4, lines 29-46 in support therefor. In addition, the  
5 Office argues that LaChapelle discloses computing a linear transformation  
6 function from the training set of their corresponding expressions, citing to the  
7 mapping template discussed in column 9, lines 43-51 in support therefor.  
8 Applicant respectfully disagrees for at least the following reason. This claim  
9 recites its first element as “operate on a *training set of expressions* from one  
10 person and *corresponding expressions* from a code book of another person to  
11 compute a linear transformation function from the *training set and their*  
12 *corresponding expressions*”. LaChapelle, on the other hand, simply maps points  
13 on a performer’s face to a single neutral expression. Thus, LaChapelle does not  
14 utilize a *training set of expressions and their corresponding expressions* as  
15 specifically recited in this claim. In addition, the LaChapelle’s mapping template  
16 is not a transformation function as that term is utilized in this claim and  
17 contemplated in Applicant’s specification. Rather, the mapping template is simply  
18 a projection of the markers on the performer’s face onto the neutral facial  
19 expression. LaChapelle’s “transformation” occurs much later in the process.

20        Accordingly, for at least these reasons, this claim is not anticipated by  
21 LaChapelle.

22        Claims 20-23 depend from claim 19 and are allowable as depending from  
23 an allowable base claim. These claims are also allowable for their own recited  
24 features which, in combination with those recited in claim 19, are neither disclosed

1 nor suggested in the references of record, either singly or in combination with one  
2 another.

3 **Claim 24 recites a facial expression transformation system comprising:**

- 4
- 5 • a code book embodied on a computer-readable medium, the code  
book containing data defining a first set of facial expressions of a  
first person;
  - 6 • data embodied on a computer-readable medium, the data defining a  
second set of facial expressions, the second set of facial expressions  
providing a training set of expressions of a second person who is  
different from the first person; and
  - 7 • a transformation processor configured to derive a transformation  
function from the training set of expressions and corresponding  
expressions from the first set of expressions.

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9 In making out the rejection of this claim, the Office argues that LaChapelle  
10 discloses data defining a second set of facial expressions that provide a training set  
11 of expressions of a second person who is different from the first-recited person. In  
12 support of its position, the Office cites to column 8, line 22-25 and indicates that  
13 the database of expressions apparently meets this claim element. Applicant  
14 respectfully disagrees. LaChapelle's database of expressions does not constitute  
15 training expressions as that term is utilized in this claim. This is more apparent  
16 when one considers the claim's next element. Specifically, the next element  
17 recites "*a transformation processor configured to derive a transformation function*  
18 *from the training set of expressions and corresponding expressions from the first*  
19 *set of expressions*". LaChapelle does not derive any transformation function from  
20 a training set of expressions and corresponding expressions from a first set of  
21 expressions. In addition, LaChapelle's mapping template is not, as the Office  
22 contends, a derived transformation function. Rather, such constitutes only a  
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1 projection of markers on a performer's face onto points on a neutral facial  
2 expression. Accordingly, for at least this reason, this claim is not anticipated by  
3 LaChapelle.

4 **Claims 25-28** depend from claim 24 and are allowable as depending from  
5 an allowable base claim. These claims are also allowable for their own recited  
6 features which, in combination with those recited in claim 24, are neither disclosed  
7 nor suggested in the references of record, either singly or in combination with one  
8 another.

9 **Claim 46** recites a method of animating facial features comprising:

- 10
- 11     • defining a subdivision surface that approximates geometry of a plurality of different faces;
  - 12     • fitting the same subdivision surface to each of the plurality of faces to establish a correspondence between the faces; and
  - 13     • using the correspondence between the faces to transform an expression of one face into an expression of another face.

15     In making out the rejection of this claim, the Office argues that Parke  
16 discloses, on page 94 under the heading "Fixed Topology" a method of animating  
17 facial features comprising defining a subdivision surface that approximates  
18 geometry of a plurality of different faces. The Office admits that Parke does not  
19 disclose fitting the same subdivision surface to each of the plurality of faces to  
20 establish a correspondence between the faces and using the correspondence  
21 between the faces to transform an expression of one face into an expression of  
22 another face. Applicant agrees.

23     The Office then relies on Georgiev and cites to column 4, lines 47-61 as  
24 disclosing these elements. Applicant respectfully disagrees. The passage cited by  
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the Office simply describes a "change vector". Nowhere does Georgiev disclose or suggest that this "change vector" is a subdivision surface as that term is utilized in the present claim. In fact, the change vector is simply a vector that represents changes between pictures in what Georgiev calls "morph space". See, e.g. column 4, lines 11-45. Nowhere can Applicant find any disclosure in Georgiev that describes "fitting the *same* subdivision surface to each of the plurality of faces to establish a correspondence between the faces" and "using the correspondence between the faces to transform an expression of one face into an expression of another face." Accordingly, for at least this reason, this claim is allowable.

Claim 47 recites a method of animating facial features comprising:

- measuring 3-dimensional data for a plurality of different faces to provide corresponding face models;
- defining only one generic face model that is to be used to map to each corresponding face model;
- selecting a plurality of points on the generic face model that are to be mapped directly to corresponding points on each of the corresponding face models; and
- fitting the generic face model to each of the corresponding face models, said fitting comprising mapping each of the selected points directly to the corresponding points on each of the corresponding face models.

In making out the rejection of this claim, the Office argues that Parke discloses the first three recited acts in this claim. The Office then argues that Georgiev supplies the last element and cites to column 4, lines 47-61. The Office then argues that it would be obvious to incorporate Georgiev's method into Parke's method to "provide flexibility in modifying images". Applicant respectfully disagrees. First, the Office has failed to establish a *prima facie* case

1 of obviousness because the stated motivation for combining these references is so  
2 broad as to support any purported modification of Parke. Hence, the Office has  
3 not met its burden.

4 Additionally, Parke discloses, in the section entitled "Fixed Topology", a  
5 single topology that represents a "wide range" of individual faces. Parke does not  
6 disclose that the single topology is to be used to *map* to each corresponding face  
7 model, as that term is understood in the context of Applicant's disclosure. See,  
8 e.g. Specification page 23, line 9 through page 28, line 10. Accordingly, for at  
9 least this reason, Parke does not disclose what the Office contends it does.

10 Further, the Office's reliance on Georgiev is misplaced at best. Georgiev  
11 does not, as the Office contends, disclose or in any way suggest "fitting the  
12 generic face model to each of the corresponding face models, said fitting  
13 comprising mapping each of the selected points directly to the corresponding  
14 points on each of the corresponding face models." The passage cited by the Office  
15 simply describes change vectors which are discussed above. Applicant has studied  
16 Georgiev and can find no disclosure or suggestion of a generic face model, as that  
17 term is utilized in the present claim and Applicant's disclosure. Accordingly, for  
18 at least this additional reason, this claim is allowable.

19 Claims 48-51 depend from claim 47 and are allowable as depending from  
20 an allowable base claim. These claims are also allowable for their own recited  
21 features which, in combination with those recited in claim 47, are neither disclosed  
22 nor suggested in the references of record, either singly or in combination with one  
23 another.

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### **Conclusion**

All of the claims are in condition for allowance. Accordingly, Applicant requests a Notice of Allowability be issued forthwith. If the Office's next anticipated action is to be anything other than issuance of a Notice of Allowability, Applicant respectfully requests a telephone call for the purpose of scheduling an interview.

Respectfully Submitted,

Dated: 6 / 26 / 03

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